erroneous; as Figure 31 is an assumed temperature gradient. A minor error occurs on the same page regarding billows in the low atmosphere and pressure changes of 0.1 mm. to 0.3 mm. Figure 57 is an old-fashioned scale in inches, not millimeters as the text requires. Again, the elevation of the station is omitted; and so we have the incongruity of a pressure curve representing an anticyclone in which the pressure reading is 29.05 inches. On page 227 the scales are again confused.

In the discussion of tropical cyclones, no mention is made of the work of Algué, Froc, or Fassig; and one looks in vain in the index for "*baguio*," "hurricane," and "typhoon"; and yet "bumps" is duly given. The work of Bigelow, Barus, both Bjerknes, Cave, Dines (J. S.), Dobson, Eiffel, Margules, Rotch, and many others is not mentioned. Certainly Bjerknes's graphic methods of dynamical meteorology and Bigelow's explanation of the origin of cyclones, whether accepted or not, should have been referred to; as well as the various papers of the latter on circulation and radiation in the atmosphere.

Some confusion exists in the use of units and symbols. R for example, is employed as symbol for gas constant, ohmic resistence, radius of rain-drop, radius of the earth, rain, and resultant amplitude. In general Professor Humphreys keeps closely to the Centigrade scale and C. G. S. units. In formulae for gradient winds, pressure differences are expressed in dynes per square centimeter which is now becoming general in aerographic literature. But, notwithstanding this, the meteorological bar is used and not the bar of the physicist.

ALEXANDER MCADIE

THE PREDICTION OF MINIMUM TEMPERATURES

J. WARREN SMITH, AND OTHERS. **Predicting Minimum Temperatures from Hygrometric Data.** 76 pp.: maps, diagrs., ills., bibliogr. *Monthly Weather Rev. Suppl. No. 16.* U. S. Dept. of Agriculture, Washington, D. C., 1920.

The need for predicting minimum temperatures is imperative in fruit regions where the growers must protect their crops against freezing. But fruit growers cannot afford the expense of protection every time the temperature *may* fall dangerously low; so an accuracy of prediction within two or three degrees (F.) is practically required when temperatures in the twenties are expected. Since most methods of protection are useless on windy nights, profitable fruit growing is confined to regions where at critical seasons the temperatures do not fall much below freezing except on clear, quiet nights. The forecaster's problem, then, is to pick, from weather map indications and the local aspect of the sky, the nights which will probably be clear and then to compute how low the temperature will fall. Under clear skies the rate of cooling is closely dependent on the moisture content of the air—dry air favoring strong radiation and a large fall in temperature. Thus, observations of humidity in the afternoon or evening can be used to predict accurately the next morning's minimum temperature when a clear night with but little wind is expected.

This collection of papers, prepared under Professor Smith's guidance, shows in detail how hygrometric data are used in actual practice in different fruit regions. Graphical and statistical methods brought into action insure the employment of the best means and the greatest accuracy at present attainable. The observations of a central station in a fruit region can be used for predicting minimum temperatures at places even several miles away, once the usual temperature differences between the central station and the outlying locality are known. Thus, if the central station has some years' length of record, only a few months' observations in different orchards are necessary before accurate local temperature forecasts are possible.

Aside from the discussions centered about the use of hygrometric data, two contributions deserve special mention. On pages 20–30 Dr. H. J. Franklin has presented a detailed discussion of "Cape Cod Cranberry Frosts," how forecast, the temperature resistance of cranberries in different stages, and ways to protect bogs from frost. On pages 46–49 Mr. J. Cecil Alter discusses "Forecasting Minimum Temperatures in Utah" especially "for sheep shearing and lambing and fruit-raising interests in spring; alfalfa seed, tomato, and vegetable interests in autumn; and shippers of perishable products and users of stream flow for hydroelectric purposes in winter." . . .

A specialized bibliography of 12 titles closes the group of papers.

CHARLES F. BROOKS